

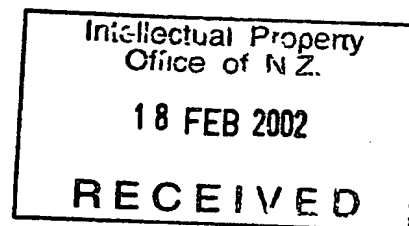


**PATENTS FORM NO. 5**  
**Patents Act 1953**

(\*) No. ....

Date: ...

**COMPLETE SPECIFICATION**



**Polar-Shifting Magnetic Part and Methods for making 3-D blocks**

(a) .....

I ~~(or WE)~~ (b). **Da Tseng of 9 Earls Court, Hamilton, New Zealand.**  
**Nationality: New Zealand.**

hereby declare the invention, for which I ~~(or we)~~ pray that a patent may be granted to me ~~(or us)~~, and the method by which it is to be performed, to be particularly described in and by the following statement (c) *continue application on page 2*

**Instructions**

(\*) *Where priority as provided by subsection (2) or subsection (3) of section 11 of the Patents Act 1953 is desired in respect of one or more provisional specifications, quote number or numbers and date or dates*

(a) *Insert title of invention*

(b) *State (in full) name, address, and nationality of applicant or applicants as in application form*

(c) *On the next page begin full description of invention. The continuation of the specification should be upon paper of the same size as this form, on one side only, with the lines well spaced and with a margin of 2.5 cm on the left hand part of the paper.*

*The completion of the description should be followed by the words "What I (or we) claim is" after which should be written the claim or claims numbered consecutively. (See note below.) The specification and the duplicate thereof must be signed at the end*

**NOTE.**--The claims must relate to a single invention, must be clear and succinct, and must be fairly based on the matter disclosed in the specification. They should form in brief a clear statement of that which constitutes the invention. Applicants should be careful that their claims include neither more nor less than they desire to protect by their patent. Any unnecessary multiplicity of claims or prolixity of language should be avoided. Claims should not be made for the efficiency or advantages of the invention.

# Polar-Inverting Magnetic Part and 3-D Shaped Connectable Block

## The Field of the Invention:

This invention relates to a new mechanical part for making 3-D shaped blocks which can be connected and hung in many directions, may be used in 3-D puzzles / games, especially suitable for making  $n \times n \times n$  Rubik's <sup>TM</sup> type Cube puzzles

## The Problems to be solved:

The standard Rubik's <sup>TM</sup> puzzle is in  $3 \times 3 \times 3$  format, many puzzle lover like to develop different formats Rubik's <sup>TM</sup> type Cube puzzles, e.g.  $2 \times 2 \times 2$ ,  $4 \times 4 \times 4$ ,  $5 \times 5 \times 5$ , the mechanical structure for the  $n \times n \times n$  Cube puzzle is very complex and hard to achieve when  $n > 5$  I had made some 3-D magnetic cubes (Ref. NZ 337644 and WO 01/17625), and had tried to arrange 27 such cubes in  $3 \times 3 \times 3$  format and putting colour stickers on the faces of the cubes, I got a cube article which looks like the Rubik's Cube, but when I twist it several times, the Cube article separated, because the small cubes are not in the same orientation, the magnets on the faces of the adjacent cubes with the same polarity would repel to each other. So, my 3-D magnetic cubes can be used for 3-D word game, but it can not be used for making Rubik-like Cubes.

We can put three magnets on three adjacent faces of a cube with the North Pole facing out, and put three magnets on the other three adjacent faces of the same cube with the South Pole facing out, then this cube can be connected by any one of six faces of another cube with the same structure It is worthy to think about the problems below.

How can we design a proper structure for the *Pyramid Block* or other block with the shape different from the cuboid ?

How can we make a special part that can be put on any face of any block, and have the block to be connected by other block, no need to worry about the polarities of these magnets ?

## The object of the invention:

The object of the present invention is to provide a convenient material and appropriate methods for making more flexible 3-D shaped connectable blocks. I hope the 3-D cubic block may perfectly solve the problems of making  $n \times n \times n$  Rubik's type Cube puzzles.

## The construction of the invention:

The aspect and advantages of the present invention will now be described with reference to the accompanying drawings, of which;

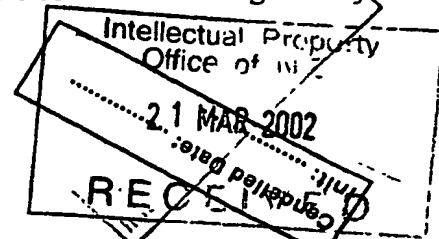
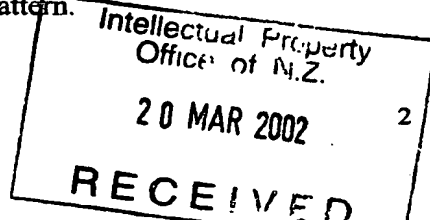
Fig. 1 shows a *Polar-Inverting Magnetic Part* and two different *3-D Shaped Connectable Blocks*.

Fig. 2 shows two pieces of different shape *Polar-Inverting Magnetic Parts*

Fig. 3 shows two couples of connected *Polar-Inverting Magnetic Parts*.

Fig. 4 shows two cubes with the same *Polar-Inverting Magnetic Parts* connected.

Fig. 5 shows eight 3-D cubes and one pyramid block are connected forming a funny pattern.



In Figure 1, the **Polar-Inverting Magnetic Parts** (1) consists of a magnet holder (10), and a piece of magnet (11). On the middle of each exposed face of the cuboid or pyramid blocks (2), there is a **Polar-Inverting Magnetic Part**(1).

In Figure 2, the magnet (11) may be cylindrical, cuboid or other shape with the North-Pole and the South-Pole pointing at different directions. The magnet holder (10) is designed for keeping the magnet within a proper space and letting the magnet can easily turn within the space, so that one face of the magnet holder (10) can be either North-Pole or South-Pole. The magnetic holder (10) is made of non-magnetic material, having a flat surface portion. The inner space of the magnet holder (10) is slippery, larger than the magnet (11) and big enough so that the magnet (11) can easily turn within the magnet holder (10), and either of the magnet's poles can adjoin the inner part of the flat surface portion of the magnet holder (10) with the pole pointing outward to attract outside ferrous objects.

In Figure 3, two pieces of cubic **Polar-Inverting Magnetic Parts** (1a) are connected horizontally, and two pieces of cylindrical **Polar-Inverting Magnetic Parts** (1b) are connected vertically. Distinguishing the Polarity of each magnet (11) within the magnetic holder (10) is trivial; the magnets (11) in the adjacent **Polar-Inverting Magnetic Parts** (1) would definitely couple with each other.

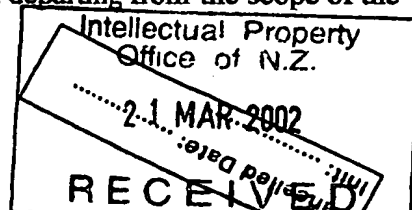
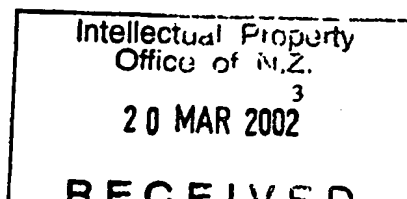
### **How the invention works:**

We can drill a hole on the center of each face of a 3-D shaped block, and put a **Polar-Inverting Magnetic Part** on each hole of the 3-D shaped blocks with the flat surface portion of the magnet holder facing out, then the 3-D shaped block would become a 3-D shaped connectable block, can be connected and hung in many directions

In Figure 4, we can see cube (2a) and cube (2b) were connected together, each cube has six **Polar-Inverting Magnetic Parts** (1) at its six faces, on the connected face, there are two **Polar-Inverting Magnetic Parts** (1a) (1b) coupled together. Any face of the cube (2a) can be connected by any face of the cube (2b), vice versa. When we are using these cubes to form a 3-D structure, we do not need to keep all the cubes *in the same orientation*, and the cubes would not to repel any more.

In Figure 5, we can see eight 3-D cubes (2d) and one pyramid block (2c) are connected forming a funny pattern, this means that different shape blocks can still be connected together, not just the 3-D cubes can do so. We can use plastic material to form a plural flat surfaces combining the magnet holding parts for a 3-D shaped block (the opening inner space of the magnetic holding part is beneath the center of the surface part), and put a piece of magnet into each magnet holding part (the size of the magnet is smaller than the inner space of the magnet holding part so that the magnet can easily turn within the magnet holding part), then seal the openings of the magnet holding parts, and connect these flat surfaces to form the 3-D shaped connectable block.

Aspects of the present invention have been described by way only and it should be appreciated that modifications and additions may be made thereto without departing from the scope of the appended claims.



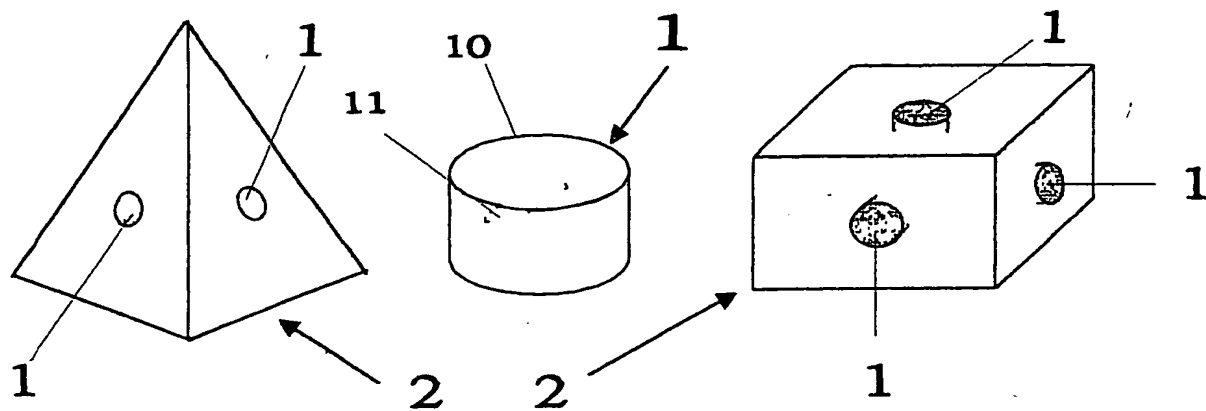


Figure 1

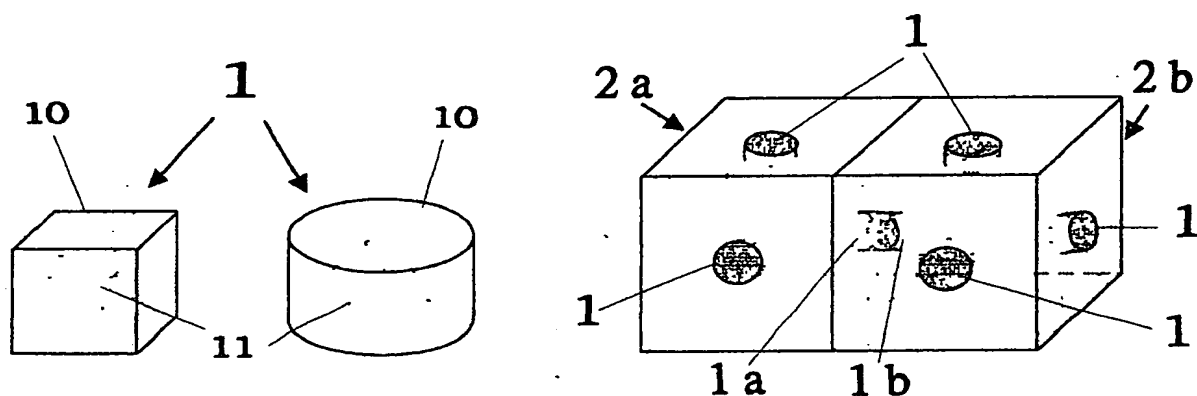


Figure 2

Figure 4

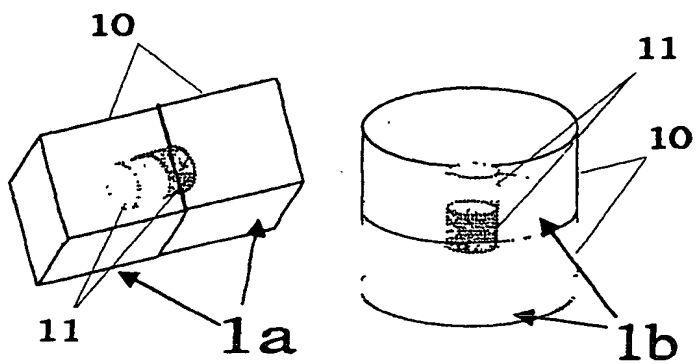


Figure 3

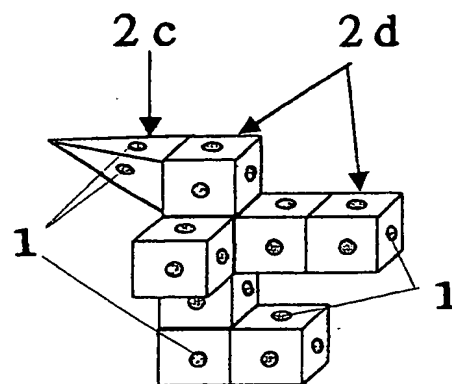


Figure 5